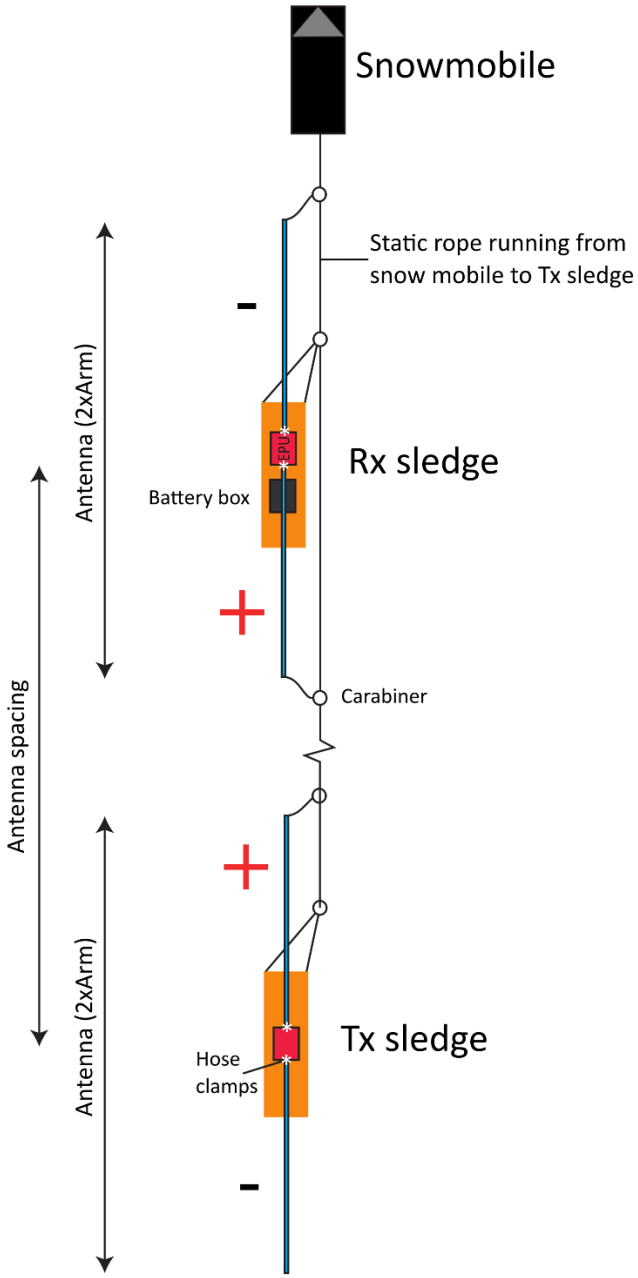
Supplementary Material

1 Appendix 1



This illustration depicts the radar set up used during this study (Ekblom Johansson, 2021*). Antenna spacing = 60 m. Antenna frequency = 2.5 MHz.

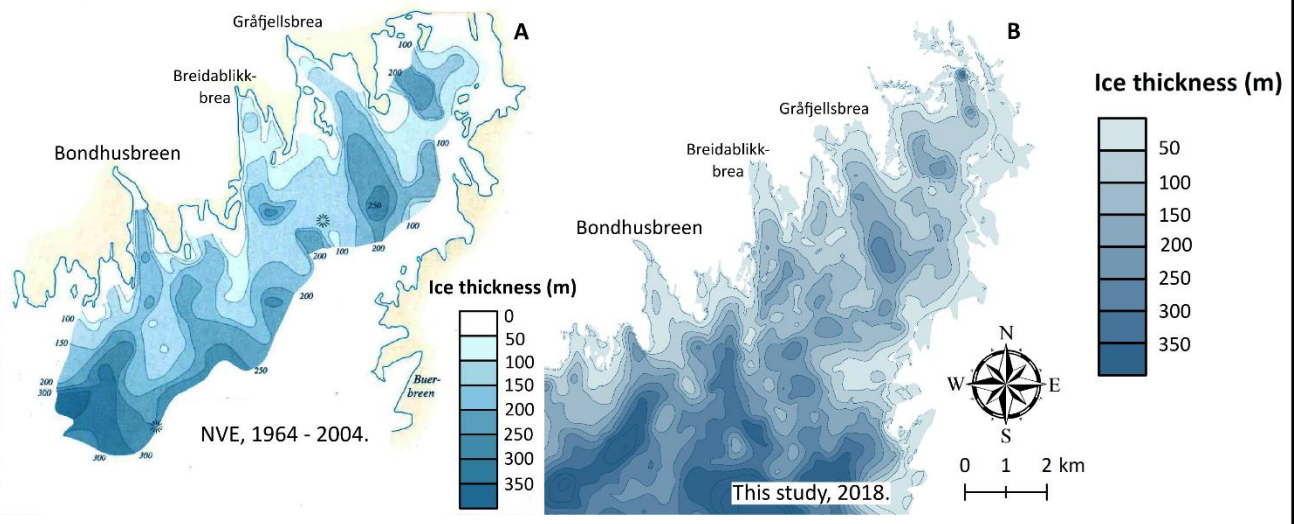
* Ekblom Johansson F (2021) 'GLACIAL AND EXTREME FLOOD VARIABILITY DURING LATE HOLOCENE AND INTO THE FUTURE Studies from Folgefonna in south-west Norway and Ata Sund in west Greenland', Ph.D. thesis, Bergen University, Norway.

2 Appendix 2: Interpolating a subglacial topography map in ArcMap

Interpolation of the bedrock topography was performed using the software ArcMap 10.6 and its interpolation tool, named ‘Topo to Raster’ (ESRI, 2016). The following protocol was followed:

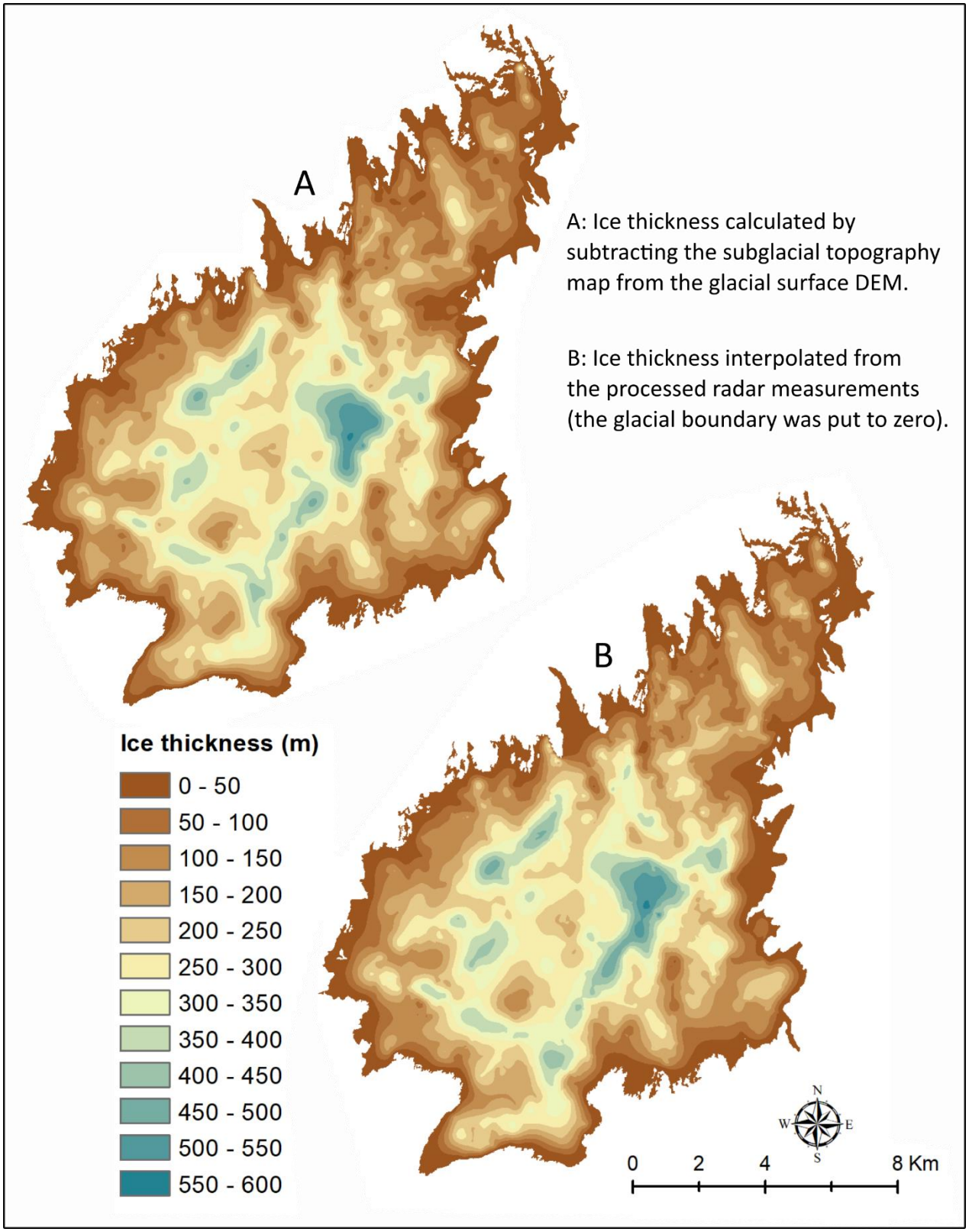
1) Import the radar profiles into ArcMap and combine them into one shape file.
2) Extract contours (contour interval = 10 m) based on the radar profiles (masl.) to prepare the data for the Topo to Raster tool.
3) Using a DEM (digital elevation model; masl.) of the area, cut out a 500 m wide zone around the ice caps’ boundary using the Buffer tool. Extract the contours (contour interval = 10 m) of the buffer zone.
4) Combine the buffer zone contours with the radar profile contours created in step two in order to gain a more correct elevation interpolation along the glacial boundary.
5) Interpolate using Topo to Raster.
6) Create contours of the resulting raster file and smooth the data.
7) Manually go through the contours and validate the topography. Remove overlapping contours from the smoothing and clearly non-natural features, such as spirals, from the interpolation, radar processing or raw data.
8) Run Topo to Raster a second time to create the finalized interpolated subglacial topography map (masl.).

3 Appendix 3: Ice thickness comparison



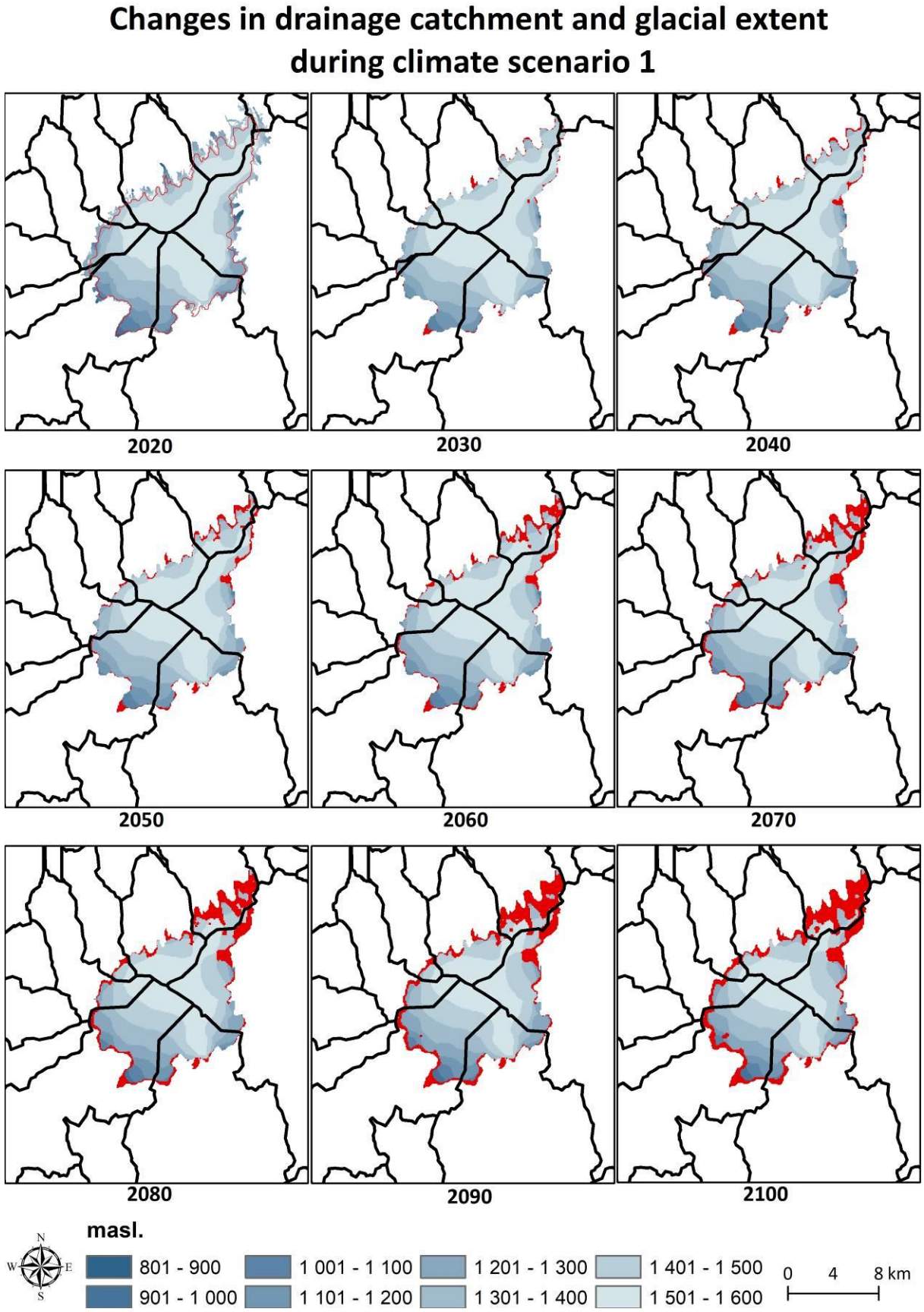
A: Interpolated ice thickness by Brekke and Nord (2008), determined by hand based on radar data collected by NVE and Statkraft AS between 1964 and 2004. B: Interpolated ice thickness from this study, determined using ArcMap 10.6.

4 Appendix 4: Comparison between the two ways of retrieving ice thickness from the datasets.

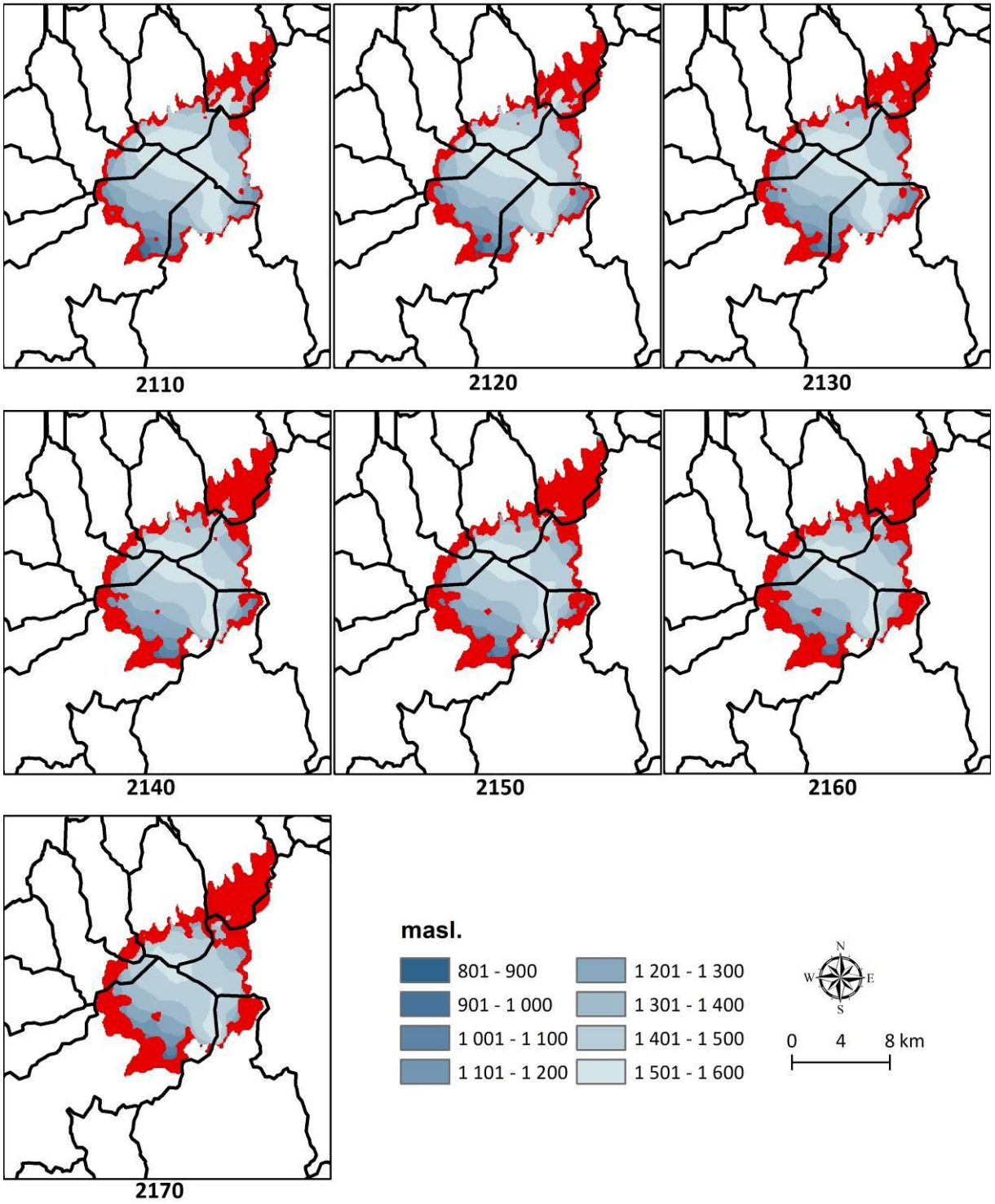


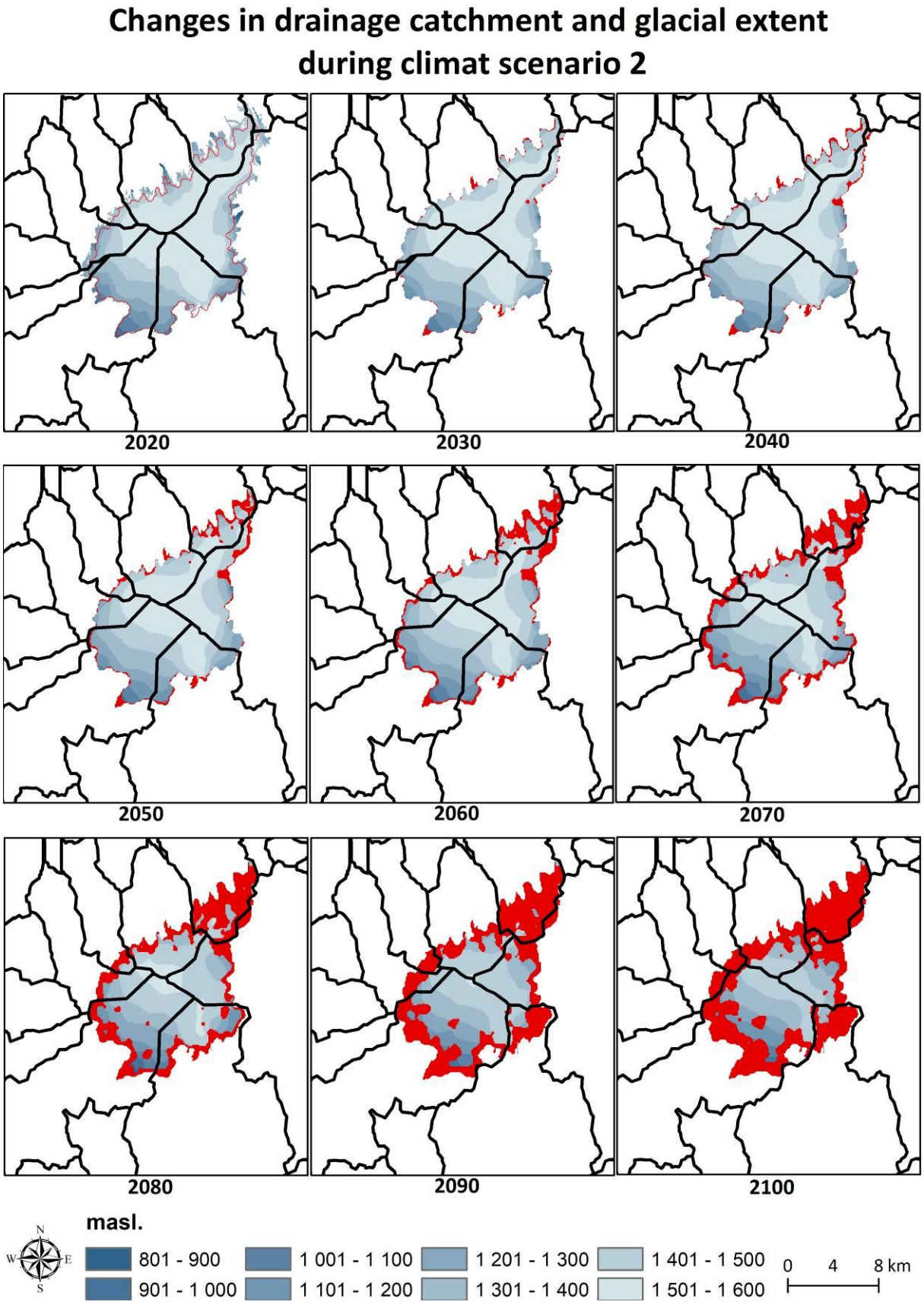
5 Appendix 5: Modelled extents for every tenth year

The following figures describe glacial extent and drainage catchments for every tenth year between 2020 and 2170. The 2020 box for both scenarios visualize the current glacial extent (DEM; 2013) overlaid by a red line representing the modelled output for 2020. The following boxes visualize the modelled volume of respective year (masl.) and the calculated drainage catchments for that glacial extent landscape (black lines).

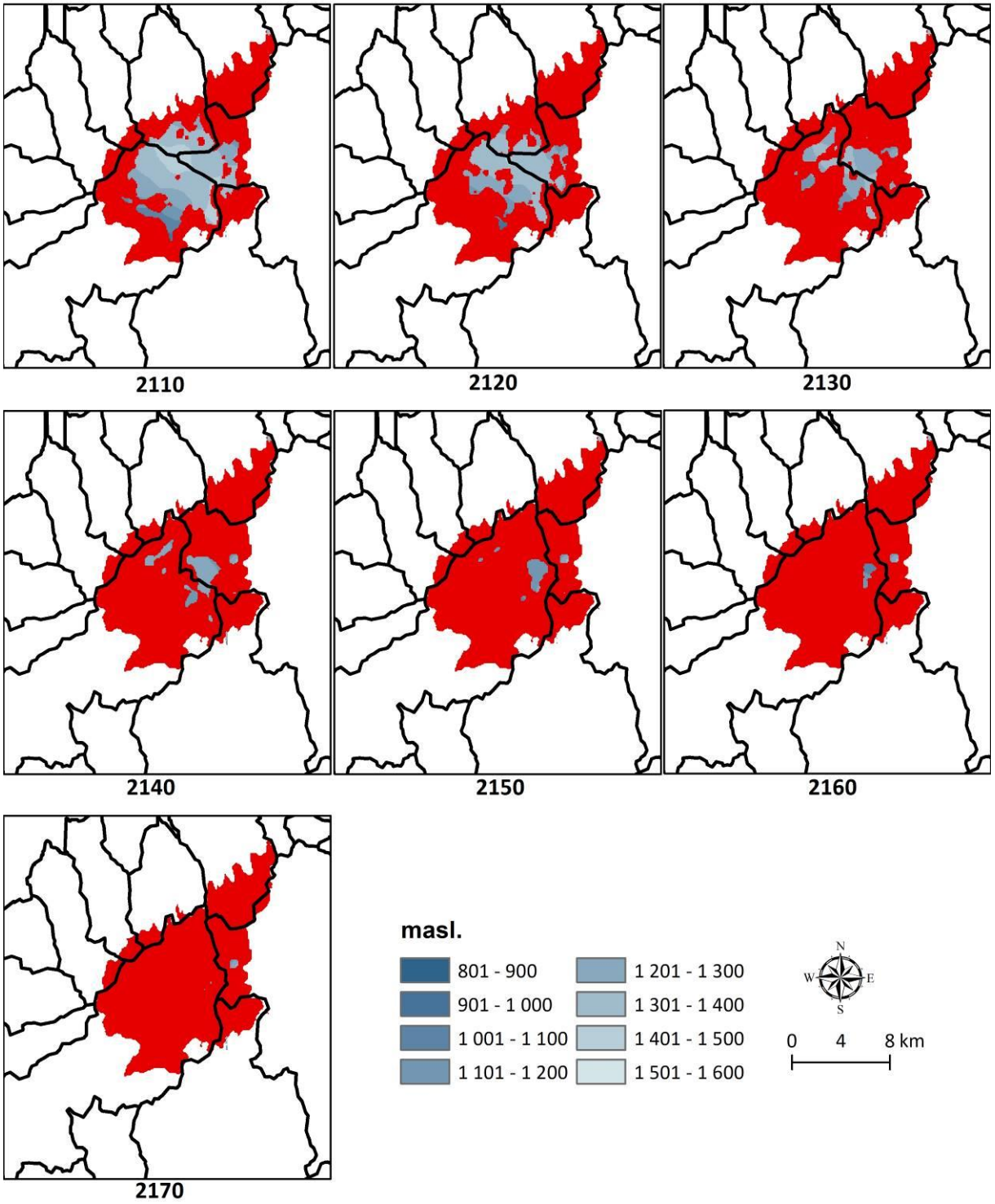

Changes in drainage catchment and glacial extent during climate scenario 1
2020
2030
2040
2050
2060
2070
2080
2090
2100
masl.
801 - 900
901 - 1 000
1 001 - 1 100
1 101 - 1 200
1 201 - 1 300
1 301 - 1 400
1 401 - 1 500
1 501 - 1 600
0 4 8 km
N
W
E
S

Changes in drainage catchment and glacial extent during climate scenario 1




Changes in drainage catchment and glacial extent during climat scenario 2
2020
2030
2040
2050
2060
2070
2080
2090
2100
masl.
801 - 900
901 - 1 000
1 001 - 1 100
1 101 - 1 200
1 201 - 1 300
1 301 - 1 400
1 401 - 1 500
1 501 - 1 600
0
4
8 km
N
W
E
S

Changes in drainage catchment and glacial extent during climate scenario 2



6 Appendix 6: Nedre Buerbreen

The image is taken from the glacial snout of Nedre Buerbreen looking up towards the glacier. Photo: Fanny Ekblom Johansson